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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/735,840	12/13/2000	Takeo Nozaki	P/1912-20	5830

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EXAMINER	
SETH, MANAV	

ART UNIT	PAPER NUMBER
2624	

DATE MAILED: 07/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/735,840	NOZAKI, TAKEO	
	Examiner	Art Unit	
	Manav Seth	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to the Amendment

1. Amendment filed on April 06, 2006 has been entered in full.

2. Applicant's amendment to the claims has been fully considered. In office action mailed on 02/24/2004 claims 1-12 were subject to restriction and/or election requirement, but the amendments to the claims filed on April 06, 2206 present the similar subject matter included in all the independent claims. Therefore the restriction and/or election requirement on the respective amended claims have been withdrawn.

3. Applicant's arguments on pages 9-10 in amendment filed April 06, 2006, with respect to the rejection(s) of claims have been fully considered but are not persuasive.

Response to Arguments

4. Applicant's arguments regarding the prior art rejections under Nozaki on pages 9-10 of the Amendment filed on April 06, 2006, have been fully considered but are not persuasive.

5. In the 3rd paragraph of the page 9 of the amendment filed, Applicant argues in substance:

a. The width of he pattern is not calculated in Nozaki nor would it be obvious to take the data developed in Nozaki to determine the width of the pattern developed in the pixel.

Examiner respectfully disagrees and still maintains the same arguments as presented before in view of reference Takeo and are presented again below.

Let's consider the limitation **"by treating the number obtained by dividing said grey level by the grey level step count as the width of the pattern developed in that pixel".** The limitation as written clearly says that a number (let's say a number W) is obtained by dividing the gray level by the gray level step count and this number is then considered as width pattern developed in the pixel.

$$\text{Width of the pattern developed in the pixel (W)} = \frac{\text{Gray level}}{\text{Gray level step count}}$$

where, **gray level** (gradation value) is calculated based on the number of sub-pixels belonging to the pattern developed in each pixel.

Now considering reference Nozaki, emphasis added, Nozaki clearly discloses "A plurality of sub-pixels are set in each pixel to calculate a multilevel gradation value and the gradation value precision of each pixel is determined by the number of sub-pixels" (para. 0030 and para. 0035). Now concentrating on the para. 0044, which provides the equation to calculate the number of gradation levels per pixel :

$$\frac{\text{(Max. gradation value MAX – min. gradation value MIN)}}{\text{(unit gradation correction value)}} = \frac{\text{Gray level}}{\text{Gray level step count}}$$

A pattern at a position is nothing but a gray level (gradation or any intensity component) present at that position and the number of gradation levels at that position would simply provide the width of that pattern, where the position being the pixel and pixel is further divided into subpixels thus providing the width of the pattern in accordance with the gradation levels associated to each

subpixel. Further emphasizing on paragraph 0045, which discloses "Note that the unit gradation correction value (the gradation correction width per step) is a gradation addition/subtraction value to be added (or subtracted) so as to enlarge (or reduce) the multilevel reference data....in units of subpixels", which makes it clear that a small width is added or subtracted to the pattern to enlarge it or reduce it and clearly gradation addition/subtraction value is taken as a width addition/subtraction. Nozaki further discloses calculating enlargement correction width (considering just as a pattern width) using gradation levels per pixel (width of the pattern in the pixel) (page 4, lines 40-55). Therefore, providing enough teachings for one of ordinary skill in the art to determine the pattern width at a corresponding position.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki et al., European Patent Application No. EP 0,899,559 A2.

Regarding claims 2 and 6, Nozaki discloses a pattern inspection method and device which scans (4) the inspected pattern formed on a substrate according to the design data with the laser beam and receives the light passed through said substrate with the light receiving device (5) and,

from the pattern information obtained by said light receiving device, generates the image of the inspected pattern (15) and, for coincidence between this image and the reference data (12) obtained by imaging of said design data, corrects by imaging of said design data, corrects said reference data to generate the reference image (13) and compares the image of said inspected pattern and the reference image to detect any defects of the inspected pattern (page 3, lines 35-44) wherein said reference image generation comprising: determining an edge boundary condition showing a grey level value corresponding to the edge position of an optical point spread function corresponding to the laser beam shape (paragraph 0061- shows generation of reference image in accordance with value or gradation of edge position (hence edge position detection means for detecting the edge position of the detected image is required) and further teaches the use of optical point spread function on the gradation data to do so which apparently corresponds to the laser beam shape since the laser beam shape is defined by the shape of the pattern scanned by the laser beam (para. 0004 and 0013 and 0060) and further discloses provision to each pixel of sub-pixels dividing the pixel to form a matrix and calculation of the gray level of the pixel based on the number of sub-pixels belonging to the pattern developed in each pixel (Figures 2-4; page 3, line 50 through page 4, line 14).

The claim 2 further recites the limitation "calculation of the pattern width for said inspected pattern and for the reference data at the corresponding position by treating the number obtained **by dividing said gray level by the gray level step count** as the width of the pattern developed in that pixel". Nozaki clearly discloses in lines 27-28 of page 4 "Note that the pattern positions of the real image 15 and the reference data 12 are compared in advance to determine whether pattern is to be enlarged or reduced". Nozaki further discloses in lines 25-26 of page 4 "Since both the enlargement processing and the reduction processing are identical in terms of the basic flow of processing, the

enlargement processing will be described". Nozaki further discloses obtaining the number of gradation levels per pixel (width of the pattern developed in the pixel) by dividing said gray level by the unit gradation correction value (page 4, equation 1), where unit gradation correction value is the gray level step count (page 4, lines 31-36). Nozaki further discloses calculating enlargement correction width (considering just as a pattern width) using gradation levels per pixel (width of the pattern in the pixel) (page 4, lines 40-55). Nozaki does not specifically teach **calculation of the pattern width for said inspected pattern and for the reference data at the corresponding position** by treating the number obtained by dividing said gray level by the gray level step count as the width of the pattern developed in that pixel. However, examiner here asserts that it would be obvious to one of ordinary skill in the art that in order to compare the inspected and reference pattern, the widths (or the similar features) of both patterns are required to be calculated to detect the defect. Examiner further asserts that keeping in view of the above teachings disclosed by Nozaki, it would be obvious for one of ordinary skill in the art at the time of invention was made to calculate the pattern width for said inspected pattern and for the reference data at the corresponding position by treating the number obtained **by dividing said gray level by the gray level step count** as the width of the pattern developed in that pixel, as the enlargement pattern correction width can just be viewed as a pattern width. Also, it would have been obvious for one of ordinary skill in the art at the time of invention was made to calculate the width of pattern if the method of calculating the width of a single pixel of the pattern is known, it being a matter of combining all pixels of pattern to determine the total width of the pattern by using simple arithmetic operations.

Claims 3 and 7 recites "the gray level of each pixel is calculated from the number of sub-pixels belonging to said inspected pattern and, treating the count obtained by dividing this gray level

by the gray level step count as the pattern width of the inspected pattern developed in the pixel, the pattern width of said inspected pattern is calculated and the gray level of each pixel is calculated from the number of sub-pixels belonging to said reference data pattern and, treating the count obtained by dividing this gray level by the gray level step count as the pattern width of the reference data developed in the pixel, the pattern width of said reference data is calculated". Nozaki, as discussed in the rejection of claim 2, discloses the gray level of each pixel is calculated from the number of sub-pixels belonging to said inspected pattern (figures 2-4; page 3, line 50 through page 4, line 14) and both inspected pattern and reference image are compared to detect the defect and the adjust the reference image with respect to the inspected pattern. Examiner here asserts that it would be obvious to one of ordinary skill in the art that in order to compare the inspected and reference pattern, the widths (or the similar features) of both patterns are required to be calculated to detect the defect and calculating the pattern width by treating the number obtained by dividing the gray level by gray level step count as the pixel width has been discussed in the rejection of claim 2. Also, it would have been obvious for one of ordinary skill in the art at the time of invention was made to calculate the width of pattern if the method of calculating the width of a single pixel of the pattern is known, it being a matter of combining all pixels of pattern to determine the total width of the pattern by using simple arithmetic operations.

Claims 4 and 8 recites "a reference image preparation method as set forth in claim 3 wherein the pattern correction width of said reference data is calculated from the difference between the pattern width of said inspected pattern and the pattern width of the reference data". As discussed in the rejection of claim 2, Nozaki discloses comparing inspected pattern width and

reference data width to calculate pattern correction width (Abstract; page 2, lines 30-34; page 3, lines 12-21, lines 40-41; page 4, lines 46-47).

Claims 10-12 recites a computer memory which stores the computer program, which when run on the system performs the method as recited in claim 2. A program to be used on a computer has to be installed in a computer memory before it is run to perform any methods. All other limitations recited in claim 10-12 have been similarly analyzed and rejected as per claims 2-4.

Claims 1, 5 and 9 rather than reciting optical point spread function corresponding to laser beam shape as in claims 2, 6 and 10, recite optical point spread function corresponding to the laser beam strength. Takeo discloses convolution operation of the optical point spread function corresponding to the laser beam strength (para. 0013 – light intensities calculated from the point divergence function and since it is the intensity of the laser beam that defines the value or gradation of the pattern pixels associated to specific pattern shape which further is defined by laser beam shape). All other limitations of claims 1, 5 and 9 have been similarly analyzed and rejected as per claims 2, 6 and 10.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manav Seth whose telephone number is (571) 272-7456. The examiner can normally be reached on Monday to Friday from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta, can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Manav Seth
Art Unit 2624
July 23, 2006